Amendments to the Claims

Kindly amend claims 1, 11, 16, 23, 28, 29, 30 & 35 as set forth below. All pending claims are reproduced below, with changes in the amended claims shown by underlining (for added matter) and strikethrough/double brackets (for deleted matter).

1. (Currently Amended) A method of halftoning comprising:

receiving input data comprising a first plurality of pels having a first plurality of intensities, wherein said first plurality of intensities (Iin) are chosen from K intensity levels;

converting the first plurality of pels having said first plurality of intensities into a second plurality of pels having a second plurality of intensities, wherein said second plurality of intensities (Iout) are chosen from L intensity levels, where $L < K$, and wherein the number of pels of the first plurality of pels is equal to the number of pels of the second plurality of pels;

wherein at least some pels of said second plurality of pels are grouped into at least one basic cell, each basic cell comprising n pels of said second plurality of pels; and

wherein a maximum number of densities per each basic cell is greater than $(1 + n\times(L-1))$ for a full range of constant input intensities (0 to K) ~~intensity~~ (Iin), and each said intensity out (Iout) is chosen without reference to an intensity out of a neighboring pel and n ~~multiple~~ pels of the first plurality of pels contribute to the output intensities of the n pels within ~~density of~~ each basic cell.

2. (Original) The method of claim 1, further comprising employing said second plurality of intensities (Iout) to place dots within each basic cell, wherein adjacent dots overlap within said basic cell.

3. (Original) The method of claim 2, further comprising producing said dots using a bilevel output device, wherein $L = 2$.

4. (Original) The method of claim 2, further comprising producing said dots using a multilevel output device, wherein $L > 2$.

5. (Original) The method of claim 2, further comprising producing said dots using a color output device, and wherein a subset of said second plurality of pels comprises one of multiple color components.

6. (Original) The method of claim 5, wherein said color output device comprises a bilevel output device, wherein L=2.

7. (Original) The method of claim 5, wherein said color output device comprises a multilevel output device, wherein L>2.

8. (Original) The method of claim 1, wherein said converting comprises point-wise thresholding using multiple threshold matrices to convert said first plurality of pels into said second plurality of pels without considering a neighboring pel.

9. (Original) The method of claim 8, wherein the multiple threshold matrices comprise a plurality of binary threshold matrices the outputs of which can be combined to produce an output image.

10. (Original) The method of claim 9, wherein the combination of outputs of the plurality of binary threshold matrices is accomplished with an exclusive OR operation.

11. (Currently Amended) A method of halftoning comprising:

allowing different placements of a same number of output dots within a basic cell to create different average densities for said basic cell, wherein adjacent output dots overlap within said basic cell, and wherein for a full range of constant input intentisites (0 to K intensity levels) ~~intensity~~ of input data and a given number of pels (n) per basic cell a number of average densities per basic cell is greater than $1 + n \times (L-1)$, where L is a number of intensity levels from which an output intensity (Iout) of each pel of the basic cell is chosen, where $L < K$; and

wherein each said intensity out (Iout) is chosen without reference to an output intensity of a neighboring pel, and n ~~multiple~~ input pels of said input data contribute to the output intensities of the n pels within ~~average density of~~ each basic cell.

12. (Original) The method of claim 11, further comprising producing said output dots using a bilevel output device, wherein L=2.

13. (Original) The method of claim 11, further comprising producing said output dots using a multilevel output device, wherein L>2.

14. (Original) The method of claim 11, further comprising producing said output dots using a color output device, wherein a subset of said pels of the basic cell comprises one of multiple color components.

15. (Original) The method of claim 14, wherein said color output device comprises one of a bilevel output device or a multilevel output device.

16. (Currently Amended) A system for halftoning comprising:

means for receiving input data comprising a first plurality of pels having a first plurality of intensities, wherein said first plurality of intensities (Iin) are chosen from K intensity levels;

means for converting the first plurality of pels having said first plurality of intensities into a second plurality of pels having a second plurality of intensities, wherein said second plurality of intensities (Iout) are chosen from L intensity levels where L < K, and wherein the number of pels of the first plurality of pels is equal to the number of pels of the second plurality of pels;

wherein at least some pels of said second plurality of pels are grouped into at least one basic cell, each basic cell comprising n pels of said second plurality of pels; and

wherein a maximum number of densities per each said basic cell is greater than (1 + n×(L-1)) for a full range of constant input intensities (0 to K) ~~intensity~~ (Iin), and each said intensity out (Iout) is chosen without reference to an intensity out of a neighboring pel and n ~~multiple~~ pels of the first plurality of pels contribute to the output intensities of the n pels within ~~density of~~ each basic cell.

17. (Original) The system of claim 16, further comprising means for employing said second plurality of intensities (Iout) to place dots within each basic cell, wherein adjacent dots overlap within said basic cell.

18. (Original) The system of claim 17, further comprising means for producing said dots using a bilevel output device, wherein L = 2.

19. (Original) The system of claim 17, further comprising means for producing said dots using a multilevel output device, wherein $L > 2$.

20. (Original) The system of claim 17, further comprising means for producing said dots using a color output device, and wherein a subset of said second plurality of pels comprises one of multiple color components.

21. (Original) The system of claim 20, wherein said color output device comprises one of a bilevel output device or a multilevel output device.

22. (Original) The system of claim 16, wherein said means for converting comprises means for point-wise thresholding using multiple threshold matrices to convert said first plurality of pels into said second plurality of pels without considering a neighboring pel.

23. (Currently Amended) A system for halftoning comprising:

a halftoning processor ~~means for~~ allowing different placements of a same number of output dots within a basic cell to create different average densities for said basic cell, wherein adjacent output dots overlap within said basic cell, and wherein for a full range of constant input intensities (0 to K intensity levels) ~~intensity~~ of input data and a given number of pels (n) per basic cell a number of average densities per basic cell is greater than $1 + n \times (L-1)$, where L is a number of intensity levels from which an output intensity (Iout) of each pel of the basic cell is chosen, where $L < K$; and

wherein each said intensity out (Iout) is chosen without reference to an output intensity of a neighboring pel, and n ~~multiple~~ input pels of said input data contribute to the output intensities of the n pels within ~~average density of~~ each basic cell.

24. (Original) The system of claim 23, further comprising means for producing said output dots using a bilevel output device, wherein $L=2$.

25. (Original) The system of claim 23, further comprising means for producing said output dots using a multilevel output device, wherein $L>2$.

26. (Original) The system of claim 23, further comprising means for producing said output dots using a color output device, wherein a subset of said pels of the basic cell comprises one of multiple color components, each color component comprising an intensity out (Iout).

27. (Original) The system of claim 26, wherein said color output device comprises one of a bilevel output device or a multilevel output device.

28. (Currently Amended) A halftoning apparatus comprising:

at least one computing unit adapted to:

receive input data comprising a first plurality of pels having a first plurality of intensities, wherein said first plurality of intensities (Iin) are chosen from K intensity levels;

convert a first plurality of pels having said first plurality of intensities into a second plurality of pels having a second plurality of intensities, wherein said second plurality of intensities (Iout) are chosen from L intensity levels wherein L < K, and wherein the number of pels of the first plurality of pels is equal to the number of pels of the second plurality of pels;

wherein at least some pels of said second plurality of pels are grouped into at least one basic cell, each basic cell comprising n pels of said second plurality of pels; and

wherein a maximum number of densities per each said basic cell is greater than (1 + n×(L-1)) for a full range of constant input intensities (0 to K) ~~intensity~~ (Iin), and each said intensity out (Iout) is chosen without reference to an intensity out of a neighboring pel and n ~~multiple~~ pels of the first plurality of pels contribute to the output intensities of the n pels within ~~density of~~ each basic cell.

29. (Currently Amended) A halftoning apparatus comprising:

at least one computing unit adapted to:

allow different placements of a same number of output dots within a basic cell to create different average densities for said basic cell, wherein adjacent output dots overlap within said basic cell, and wherein for a full range of constant input intensities (0 to K intensity levels) ~~intensity~~ of input data and a given number of pels (n) per basic cell a number of average densities per basic cell is greater than 1 + n×(L-1), where L is a

number of intensity levels from which an output intensity (Iout) of each pel of the basic cell is chosen, where $L < K$; and

wherein each said intensity out (Iout) is chosen without reference to an output intensity of a neighboring pel, and n ~~multiple~~ input pels of said input data contribute to the output intensities of the n pels within ~~average density of~~ each basic cell.

30. (Currently Amended) A machine-readable medium having stored thereon data representing sequences of instructions, the sequences of instructions which, when executed by a processor, cause the processor to:

receive input data comprising a first plurality of pels having a first plurality of intensities, wherein said first plurality of intensities (Iin) are chosen from K intensity levels;

convert a first plurality of pels having said first plurality of intensities into a second plurality of pels having a second plurality of intensities, wherein said second plurality of intensities (Iout) are chosen from L intensity levels wherein $L < K$, and wherein the number of pels of the first plurality of pels is equal to the number of pels of the second plurality of pels;

wherein at least some pels of said second plurality of pels are grouped into at least one basic cell, each basic cell comprising n pels of said second plurality of pels; and

wherein a maximum number of densities per each said basic cell is greater than $(1 + n \times (L-1))$ for a full range of constant input intensities (0 to K) ~~intensity~~ (Iin), and each said intensity out (Iout) is chosen without reference to an intensity out of a neighboring pel and n ~~multiple~~ pels of the first plurality of pels contribute to the output intensities of n pels within ~~density of~~ each basic cell.

31. (Original) The machine-readable medium of claim 30, wherein the sequences of instructions further include instructions which, when executed by the processor, cause the processor to employ said second plurality of intensities (Iout) to place dots within each basic cell, wherein adjacent dots overlap within said basic cell.

32. (Original) The machine-readable medium of claim 31, wherein the sequences of instructions further include instructions which, when executed by the processor, cause the processor to produce said dots using a bilevel output device, wherein L = 2.

33. (Original) The machine-readable medium of claim 31, wherein the sequences of instructions further include instructions which, when executed by the processor, cause the processor to produce said dots using a multilevel output device, wherein L > 2.

34. (Original) The machine-readable medium of claim 30, wherein the sequences of instructions further include instructions which, when executed by the processor, cause the processor to implement point-wise thresholding using multiple threshold matrices to convert said first plurality of pels into said second plurality of pels without considering a neighboring pel.

35. (Currently Amended) A machine-readable medium having stored thereon data representing sequences of instructions, the sequences of instructions which, when executed by a processor, cause the processor to:

allow different placements of a same number of output dots within a basic cell to create different average densities for said basic cell, wherein adjacent output dots overlap within said basic cell, and wherein for a full range of constant input intensities (0 to K intensity levels) ~~intensity~~ of input data and a given number of pels (n) per basic cell a number of average densities per basic cell is greater than $1 + n \times (L-1)$, where L is a number of intensity levels from which an output intensity (Iout) of each pel of the basic cell is chosen, where $L < K$; and

wherein each said intensity out (Iout) is chosen without reference to an output intensity of a neighboring pel, and n ~~multiple~~ input pels of said input data contribute to the output intensities of the n pels within ~~average density of~~ each basic cell.

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